

Apparent Decline in Density of Diffuse Knapweed Associated with Biological Control

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Diffuse knapweed, *Centaurea diffusa* Lamarck (Asteraceae), occurs in California as single plants or in small patches, and is under eradication in most areas of the state. One exception occurs in the South Fork Mountain area of Trinity County where the Biological Control Program has had an ongoing project to release and evaluate available biological control agents. Six agents are currently established in this area, with two capitulum weevils-*Bangasternus fausti* (Reitter) (Coleoptera: Curculionidae) and *Larinus minutus* Gyllenhal (Coleoptera: Curculionidae) having increased to high levels at their respective release sites and appearing to be making an impact on seed production. *B. fausti* was first released in 1994 along Miller Road at a location named the 'monitoring' site. *L. minutus* was first released in 1995 approximately 0.5 miles away. By 1998, both weevils could be found at the monitoring site in low numbers, and by 2001, both were well represented. Previous reports have discussed the phenomenon of clustering of the two weevils as well as preliminary analysis of seed destruction. In this report we discuss long-term changes in plant density concurrent with increased amount of the biological control insects.

Density measures of diffuse knapweed plants were made annually in permanent plots in the fall. A total of 30 quadrats, each one half meter by one half meter were evaluated along each of two transects established through an established stand of diffuse knapweed. Attack of the biological control insects was evaluated by collecting 10 randomly selected plants outside the transects each year, and evaluating each seedhead in the laboratory for evidence of attack.

From 1995 through 1998, the density of diffuse knapweed more than doubled within our plot area. Populations of the biological control insects were also dramatically increasing during this same period to nearly 80 percent of the seedheads attacked. Insects attack rates have remained high (over 70 percent) from that point forward. Diffuse knapweed plant densities have declined each year that the attack rate was at least 70 percent. While we cannot rule out all other factors at this point, competing vegetation has not increased within the plot during the course of the study. Consequently, we are optimistic that the decline in diffuse knapweed plant density is due to the biological control agents.

Impact of Biological Control on Diffuse Knapweed in Trinity County

